rejecting a claim under the first paragraph of 35 U.S.C. §112 for lack of adequate enabling support, it is incumbent upon the Examiner to establish a basis in fact and/or cogent technical reasoning to support the legal conclusion that one having ordinary skill in the art would not be able to practice the claimed invention, armed with the supporting specification, **without undue experimentation**. *In re Brana, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995); In re Marzocchi, 439 F.2d 220, 169 USPA 367 (CCPA 1971).* It is emphasized that a patent disclosure is directed to one having ordinary skill in the art. *In re Howarth, 654 F.2d 103, 210 USPQ 689 (CCPA 1981).* Moreover, and quite significantly, it has been repeatedly held that the scope of enablement varies inversely with the degree of predictability in the art, i.e., enablement is a function of complexity of the involved subject matter. *Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 15 USPQ2d 1321 (Fed. Cir. 1990); U.S. v. Telectronics Inc., supra.* Applicants stress that a patent specification is **presumed enabling** in the absence of a reason to doubt the objective truth of the statements contained therein. *In re Brana, supra; In re Marzocchi, supra.*

In applying the above legal tenet to the exigencies of this case, Applicants submit that the Examiner has **not** established a prima facie basis to deny patentability to the claimed invention under the first paragraph of 35 U.S.C.§112 for lack of adequate enabling support. Merely offering a conclusion of lack of enablement does **not** overcome the judicially establish **presumption** that the present disclose is, in fact, **enabling**. *In re Brana, supra; In re Marzocchi, supra.*

Indeed, Applicants find it inconceivable that one having ordinary skill in the art, out in the real world, should not have been able to process different metals in different

manners, given the state of the art in metallurgy, so that the metals would exhibit different hardnesses, as by tempering, quench hardening, annealing, etc.. The Examiner is required to do more than say a disclosure is not enabling; **the Examiner must overcome a judicial presumption that it is enabling with hard facts.** *In re Brana, supra; In re Marzocchi, supra.* That burden has not been discharged.

Applicants, therefore, submit that the imposed rejection of claim 1 under the first paragraph of 35 U.S.C. §112 for lack of adequate enabling support is not legally viable and, hence, solicit withdrawal thereof.

Claims 1 and 7 were rejected under the first paragraph of 35 U.S.C. §112 for lack of adequate descriptive support.

This rejection is traversed as factually and legally erroneous.

In stating the rejection, the Examiner points to Figs. 1-2B of the present invention and the related discussion thereof pages 4 through 7, asserting that layer 5, which the Examiner chooses to identify as the protective insulating layer, appearing in Figs. 1-2B, is the substantially coplanar with the plurality of connecting conductors 10/4. **The Examiner has misinterpreted the claimed invention as well as the disclosure.**

The protective layer depicted in Figs. 1-2B is **not** designated by reference numeral 5, but reference numeral 3, as clearly defined on page 4 of the written description of the specification, lines 21 and 22, i.e., "A protective layer 3...." Layer 5 comprises a plurality of sealing resins (second full paragraph at 5 of the written description of the specification). It is, therefore, apparent that one having ordinary skill in the art would have understood from the originally filed disclosure that Applicants had

possession of the now claimed subject matter. *In re Anderson, 471 F.2d 1237, 176 USPQ 331 (CCPA 1973).*

Applicants, therefore, submit that the imposed rejection of claims 1 and 7 under the first paragraph of 35 U.S.C. §112 for lack of adequate descriptive support is not factually or legally viable and, hence, solicit withdrawal thereof.

Claims 1 through 3 were rejected under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in view of Ohtsuka et al. and Omoya et al.

In the statement of the rejection, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the acknowledged prior art (Fig. 3) by forming the connecting conductor of a plurality of layers of different material in view of Ohtsuka et al. who are said to disclose forming a connecting conductor of a plurality of layers. This rejection is traversed.

The semiconductor device defined in independent claim 1 comprises a connecting conductor including a plurality of layers formed of the **same** material. This feature is neither disclosed nor suggested by the acknowledged prior art, Ohtsuka et al. or Omoya et al. Accordingly, even **if** all the applied references are combined in some manner, and Applicants **do not** agree that the requisite motivation has been established, the claimed invention would **not** result. *Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988).*

Applicants **again** point out that Ohtsuka et al. merely disclose a plurality of **barrier layers** between electrode pads and external terminals. Omoya et al. merely

disclose the insertion of an anisotropic conductive film entirely between a semiconductor chip and a mounting substrate. These structures are, manifestly, quite **different** from the claimed invention.

Furthermore, independent claim 1 specifies that the plurality of connecting conductors extend **beyond** the outer outside surface of the protective insulating film. What the Examiner has **mistakenly** interpreted as a conducting conductor of the semiconductor device disclosed by Ohtsuka et al., is **not a connecting conductor** that protrudes from the protective insulating layer, **but part of the insulating layer itself** and serves as a diffusion barrier. The layers identified by the Examiner do **not** extend **beyond** the protective insulating layer. In fact, there are no connecting conductors to the protruding contacts 37.

Moreover, the Examiner failed to establish requisite motivation of element has been established. Specifically, the Court of Appeals for the Federal Circuit has imposed upon the Examiner the burden of making a "thorough and searching" factual inquiry and, based upon such facts, explain **why** one having ordinary skill in the art would have been realistically led to combine the applied prior art. *In re Lee, __F.3d__, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002).* Indeed, the Examiner must make "clear and particular" factual findings as to a specific understanding or specific technological principle which would have realistically impelled one having ordinary skill in the art to modify a specific prior art device (the Fig. 3 device) to arrive at the claimed invention based upon facts--not generalizations. *Ruiz v. A.B. Chance Co., 234 F.3d 654, 57 USPQ2d 1161 (Fed. Cir. 2000); Ecolochem Inc. v. Southern California Edison, Co. 227 F.3d 1361, 56 USPQ2d 1065 (Fed. Cir. 2000); In re Kotzab, 217 F.3d 1365, 55 USPQ 1313 (Fed. Cir. 2000); In*

re Dembiczak, 175 F.3d 994, 50 USPQ2d 1614 (Fed. Cir. 1999). Again, the Examiner is **required** to **explain why** one having ordinary skill in the art would have been realistically motivated to modify the Fig. 3 device to arrive at the claimed invention based upon the teachings of the secondary references. *Ecolochem Inc. v. Southern California Edison, Co, supra.; In re Rouffet, 149 F.3d 1350, 47 USPQ2d 1453 (Fed. Cir. 1998).* That burden has **not** been discharged.

The Examiner merely points to diffusion barriers within a protective insulating layer and then concludes that one having ordinary skill in the art would somehow have been motivated to employ plural layers for the connecting conductor 4 of the Fig. 3 device which extends completely beyond the protective layer 3 and encapsulated by resin. The Examiner says that he motivation is to provide a stress absorbing layer, but does **not** point to anything in Ohtsuka et al to support that assertion. Clearly, the diffusion barriers of Ohtsuka et al. perform a different function from that performed by the connecting conductive 4 of the Fig. 3 device.

If the Examiner is predicating the rejection upon the determination that **upon** combining Ohtsuka et al. with the Fig. 3 device, the requirement of claim 1 for a stress-absorbing layer having a lower hardness would **inherently** be met, such an approach is **clearly legally erroneous**. Firstly, inherency requires **certainty, not speculation**. *Finnegan Corp. v. ITC, 180 F.3d 1354, 51 USPQ2d 1001 (Fed. Cir. 1999); In re Robertson, 169 F.3d 743, 49 USPQ2d 1949 (Fed. Cir. 1999).* It is **not** apparent why the thin diffusion barrier layers of Ohtsuka et al., including that made of gold, would inherently, i.e., **necessarily**, serve as a stress-absorbing layer. Further, the theory that **if** the Fig. 3 device is appropriately modified, **then** the claimed invention would result, is an

approach which has been repeatedly judicially condemned as **confusing obviousness with inherency**. *In re Rijckaert, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993); In re Shetty, 566 F.2d 81, 195 USPQ 753 (CCPA 1977); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976).*

Applicants again separately argue the patentability of **claims 2 and 3**. The Examiner has concluded that one having ordinary skill in the art would have been motivated to further modify the acknowledged prior art device by forming the connecting conductor ".... from an isotropic conductive material containing metal particles to reduce the mechanical stress for the interconnection...." (third full paragraph on page 4 of the January 3, 2002 Office Action). Applicants disagree. Firstly, it is **not** apparent and the Examiner has **not** identified wherein the purpose of reducing mechanical stress for the interconnection is disclosed in the applied prior art, or that the problem of mechanical stress is even recognized. Merely pointing to features of a claimed invention perceived to reside in disparate reference does not establish the requisite realistic motivation. I*n re Kotzab, 217 F.3d 1365, 55 USPQ 1313 (Fed. Cir. 2000); Grain Processing Corp. v. American-Maize Products Co., 840 F.2d 902, 5 USPQ2d 1788 (Fed. Cir. 1988).*

Based upon the foregoing it should be apparent that a prima facie basis to deny patentability to the claimed invention have not been established. Moreover, Applicants again stress there is a **potent indicium of nonobviousness** which requires consideration.

It is well settled that the **problem** addressed and solved by a claimed invention must be given consideration in resolving the ultimate legal conclusion of obviousness under 35 U.S.C. §103. *North American Vaccine, Inc. v. American Cyanamid Co., 7 F.3d 1571, 28 USPQ2d 1333 (Fed. Cir. 1993); Northern Telecom, Inc. v. Datapoint Corp.,*

908 F.2d 931, 15 USPQ2d 1321 (Fed. Cir. 1990); In re Newell, 891 F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989). Applicants address and solve the problem of cracking in conventional CSP packages as a result of a difference in coefficients of linear expansion between the semiconductor chip 1 and the ceiling resin 5 (Fig. 3). It is **not** apparent and the Examiner has **not** identified wherein that problem is even recognized in the applied prior art, let alone addressed and a solution offered. Under such circumstances, the **problem** addressed and solved by the present invention is entitled to consideration as an indicium of **nonobviousness**.

The above arguments were present for the Examiner's consideration in the responsive Amendment submitted April 8, 2002. Beginning in the eighth enumerated paragraph on page 7 of the June 14, 2002 Office Action, the Examiner states that the arguments presented "have been considered but are rendered moot in view of the new ground (as) of rejection." -- What new grounds of rejection?

The rejection imposed appears to be the identical rejection imposed in the previous Office Action of January 3, 2002. Applicants have gone through considerable expense to respond to the rejection and present arguments raising issues. The Examiner can not duct the arguments and duct the issues by asserting that other new grounds of rejection have been imposed. Applicants are entitled to a response.

Conclusion

It should be apparent from the foregoing **indisputed arguments** that a prima facie basis to deny patentability to the claimed invention has **not** been established. Moreover, upon giving due consideration to the **problem** of CSP cracking addressed and solved by

the claimed invention due to a difference in coefficients of linear expansion between the semiconductive chip and sealing resin, the conclusion appears inescapable that one having ordinary skill in the art would **not** have found the claimed invention **as a whole** obvious within the meaning of 35 U.S.C. §103. *Jones v. Hardy, 727 F.2d 1524, 220 USPQ 1021 (Fed. Cir. 1984).*

Applicants, therefore, submit that the imposed rejection of claims 1 through 3 under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in view of Ohtsuka et al. and Omoya et al. is not factually or legally viable and, hence, solicit withdrawal thereof.

Claims 4 through 6 were rejected under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in view of Ohtsuka et al., Omoya et al., Matsumoto et al. and Chakravorty.

In the statement of the rejection, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify whatever semiconductive device can be said to have been reasonably suggested by the combined disclosures of the acknowledged prior art, Ohtuska et al. and Omoya et al. and Applicants do not agree that the requisite motivation has been established, by staggering a plurality of conductive layers having different diameters in view of Matsumoto et al. and Chakravorty.

Firstly, claims 4 through 6 depend from independent claim 1. Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 1 under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art (Fig. 3) in view of Ohtsuka et al. and Omoya et al. Specifically, in imposing in the

rejection the Examiner has apparently ignored the limitation in claim 1 requiring the connecting conductors to include a plurality of layers formed of the **same** material, with one of the layers formed as a stress-absorbing layer having a lower hardness than other layers. The relied upon Ohtsuka et al. reference discloses different barrier layers disposed between electrode pads and external terminals. Moreover, the barrier layers are an within the dielectric protection layer 34 (Fig. 3 of Ohtsuka et al.) and do not extend or project beyond the protective layer. The Examiner has **not** established the requisite motivation which would have realistically impelled one having ordinary skill in the art to modify the acknowledged prior art device by forming the connective conductive member, an **element which does not even exist in the device disclosed by Ohtsuka et al.**, of a plurality of layers merely because Ohtsuka et al. provide diffusion barrier layers within the protective dielectric layer. Moreover, and to whatever extent the Examiner is relying upon the doctrine of inherency, i.e., that **if** the prior art device is modified by providing a plurality of layers, **then** one of them would necessarily serve as a stress-absorbing layer, **such an approach is legally erroneous because it lacks the requisite certainty and confuses obviousness with inherency.** *In re Rijckaert, supra.; In re Shetty, supra.*

The additional references to Matsumoto et al. and Chakravorty do **not** cure the argued deficiencies in the attempted combination of the acknowledged prior art, Ohtsuka et al. and Omoya et al. Accordingly, even **if** all of the applied references are combined, the claimed invention would **not** result. *Uniroyal, Inc. v. Rudkin-Wiley Corp., supra.*

Moreover, Applicants separately argue the patentability of **claims 4 through 6**. Specifically, as previously stressed, in order to establish the requisite realistic motivation, the Examiner is required to explain **why** one having ordinary skill in the art would have

been realistically motivated to modify whatever semiconductor device can be said to have been suggested by the combined disclosures of the acknowledged prior art, Ohtsuka et al. and Omoya et al., by stacking conductive layers having substantially identical or different diameters, based on facts. *Ecolochem v. Southern California Edison, supra.; In re Rouffet, supra.* The Examiner has merely pointed to Matsumoto et al., who do **not** relate to packaging but to **wiring circuitry within the device itself**, not for external connections. Applicants stress that Matsumoto et al. merely disclose an **internal** structure of a semiconductor chip; Matsumoto et al. do **not, repeat not**, disclose a connection structure between electrode pads and external terminals. Obviously, conductive wirings are staggered within the semiconductor device since the wiring pattern defines circuitry. **But this has nothing to do with a connecting conductor between the chip itself and the solder ball for external connection.**

Applicants would note that Matsumoto et al. do not teach that staggering layers reduces mechanical stress and improves bonding strength of the interconnection. Matsumoto et al. merely disclose interconnects to form the **internal** circuitry of the semiconductor chip--**not external connections**.

The newly cited reference to Chakravorty is of no avail. What the Examiner identifies in the ultimate full paragraph on page 6 of the June 14, 2002, Office Action as "a plurality of conducting layers (310, 311, etc. in Fig. 8c/d)" is overstated. Layer 310 is merely an underbump metal layer to connect trace 307 to contact pad 304 placed on the chip. The actual bump is designated by layer 311 which is an element **different** from the underbump metallization 310. Further, layers 310 and 311 do **not** appear to be of the same material, as specified in claim 1. In addition, the Examiner has conspicuously

avoided even attempting to point out wherein Chakravorty addresses the stress problem addressed and solved by the claimed invention, or the concept of providing a layer of reduced hardness to provide stress relief.

Moreover, as previously pointed out, the applied prior art neither recognizes nor addresses the stress problem addressed and solved by the claimed invention. The absence of a prima facie case coupled with such a potent indicium of nonobviousness compels the conclusion that one having ordinary skill in the art would **not** have found the claimed invention **as a whole** obvious within the meaning of the 35 U.S.C. §103. *Jones v. Hardy, supra.*

Applicants, therefore, submit that the imposed rejection of claims 4 through 6 under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in view of Ohtsuka et al., Omoya et al., Matsumoto et al. and Chakravorty is not factually or legally viable and, hence, solicit withdrawal thereof.

Claims 7 through 10 were rejected under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in view of Ohtsuka et al. and Omoya et al.

This rejection is traversed.

Ohtsuka et al. do not teach or disclose a connecting member having a plurality of layers. Ohtsuka et al. merely disclose a plurality of diffusion barriers within a protective dielectric layer. In accordance with the semiconductor device defined in claim 7, the connecting conductors extend beyond the outer surface of the protective insulating layer. This being the case, it is **not** apparent and the Examiner has **not** explained **why** one

having ordinary skill in the art would have been realistically impelled to modify the Fig. 3 device by providing a plurality of layers of different material to form the connecting conductor, merely because of the diffusion barriers disclosed by Ohtsuka et al. within the protective insulating layer. *In re Rouffet, supra.*

To whatever extent the Examiner is relying upon the doctrine of inherency, such reliance is misplaced for lack of certainty in concluding that one of the layers would necessarily reduce stress and in confusing obviousness with inherency. *In re Rijckaert, supra; In re Shetty, supra.* Moreover, the **problem** addressed and solved by the claimed invention, i.e., stresses caused by a difference in coefficients of linear expansion between the semiconductor chip and sealing resin, is not recognized or addressed by the applied prior art. *Jones v. Hardy, supra.*

The above argument was presented to the Examiner in the April 8, 2002 responsive Amendment. Unfortunately, the Examiner has not seen fit to dispute any of the arguments advanced. In other words, in the June 14, 2002 Office Action, the Examiner ignores Applicants arguments. **This is improper and borders on arbitrary agency action.** ***In re Lee, supra.***

It should, therefore, be apparent that a prima facie basis to deny patentability to the claimed invention has not been established for lack of the requisite factual basis and want of the requisite realistic motivation. Moreover, upon giving due consideration to the problem addressed and solved by the claimed invention, the conclusion appears inescapable that one having ordinary skill in the art would **not** have found the claimed invention **as a whole** obvious within the meaning of 35 U.S.C. §103. *Jones v. Hardy, supra.*

Applicants, therefore, submit that the imposed rejection of claim 7 through 10 under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in view of Ohtsuka et al. and Omoya et al. is not factually or legally viable and, hence, solicit withdrawal thereof.

Claims 11 through 13 were rejected under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in view of Ohtsuka et al., Omoya et al., Matsumoto et al. and Chakravorty.

This rejection is traversed.

Claims 9 through 13 depend from claim 7. Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 7 under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art (Fig. 3) in view of Ohtsuka et al. and Omoya et al. Specifically, the Examiner has **failed** to provide **objective evidence** to support the conclusion that one having ordinary skill in the art would have been realistically motivated to modify the Fig. 3 device to arrive at the claimed invention. *In re Lee, supra.* In this respect, Applicants again note that the semiconductor device disclosed by Ohtsuka et al. does not even have a connecting conductor as in the claimed invention which extends beyond the outer surface of the protective insulating layer. The relied upon diffusion barrier layers are in the protective insulating layer of the device disclosed by Ohtsuka et al. It is not apparent and the Examiner has not explained **why** one having ordinary skill in the art would somehow been **realistically** impelled to deviate from the Fig. 3 device by forming connecting conductors that extend beyond the outer surface of the protective insulating layer, merely

because of the diffusion barriers disclosed by Ohtsuka et al. within the protective insulating layer.

Further, Matsumoto et al. do not relate to connective conducting layers but merely to an interconnect pattern defining internal circuitry. It is not apparent and the Examiner has not explained why one having ordinary skill in the art would somehow been realistically motivated to modify the single connecting conductor of the Fig. 3 device by forming a plurality of staggered layers of different material, merely because of the conventionality of an interconnection pattern disclosed by Matsumoto et al. which does not relate to a connecting conductor to a bump external terminal. Further, as also previously argued, the applied art neither recognizes nor addresses the cracking problem addressed and solved by the claimed invention.

As previously pointed out, the additional reference to Chakravorty is of no avail. Reference numeral 311 identifies an underbump layer which merely provides electrical connection to trace 307 which is connected to contact pad 304 on the chip. The actual bump layer is designated by reference numeral 314 (Fig. 8d). The Examiner has not pointed out wherein Chakravorty discloses or suggests the concept of providing a layer having reduced hardness for any purpose, let alone for stress relief, as in the claimed invention.

It should, therefore, be apparent that a prima facie basis to deny patentability to the claimed invention has **not** been established. Further, upon considering the **problem** addressed and solved by the claimed invention as a potent indicium of **nonobviousness**, Applicants submit that one having ordinary skill in the art would **not** have found the

claimed invention **as a whole** within the meaning of 35 U.S.C. §103. *Jones v. Hardy, supra.*

Applicants, therefore, submit that the imposed rejection of claims 11 through 13 under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art (Fig. 3) in view of Ohtsuka et al., Omoya et al., Matsumoto et al., and Chakravorty is not factually or legally viable and, hence, solicit withdrawal thereof.

It should be apparent from the foregoing arguments that the imposed rejections are not viable, and that all pending claims are in clear condition for immediate allowance. Favorable consideration is, therefore, respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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